from Devil's Lake but are present in great quantities. Detailed physical and chemical experiments await further investigations, but present information does not indicate that the toxic action of salts is responsible for the Devil's Lake inhibition of plant forms growing in bodies of sweet water adjacent to Devil's Lake.

*Nuclear Phenomena in the Basidium and in the Germinating Spores of Dacrymyces and Tremella:* E. M. GILBERT.

The discovery of the fusion of two nuclei in the basidium and the further fact that the cells from which the basidia arise are binucleate, has made it of vital interest to discover the origin of this binucleate condition. The writer finds that the spores of certain species of *Dacrymyces* and *Exidia* are uninucleate and become in germination, successively two, four and eight celled, each cell being uninucleate. Germ tubes are then developed and a mycelium formed, the cells of which have a single nucleus. The binucleate condition does not then arise at the germination of the spore or in the young mycelium. Dangeard, Perrot and Maire find that the subhymenial cells of various forms are binucleate. The writer finds a nuclear fusion in the young basidia of *Exidia albida* and *Dacrymyces* sp. The double division of the fusion nucleus in species of *Exidia* and *Tremella* studied, suggests, in many of its features, that chromosome reduction occurs at this stage. Synapsis and diakinesis are well marked stages. The two spored basidia of *Dacrymyces* as noted by Juel and Dangeard raise an interesting question as to the method of reduction in this form.

*The Organization of the Chromosomes in Carex:* A. B. STOUT.

The visible structures in the resting nuclei in the root tip of *Carex aquatilis* and their behavior throughout mitosis make it plain that here the chromosomes are permanent individuals which can be identified not only in resting nuclei, but throughout the entire process of nuclear and cell division, except for a short time during the diaster stage when they are closely massed together.

The chromosomes are also arranged in a definite serial place relationship which is preserved throughout the late prophases and the equatorial plate stage. There is thus maintained throughout all stages of division a definite relative position of the chromosomes.

The spheroidal shape of the chromosomes is quite constant and uniform. There is, however, marked growth in their volume during early prophases until they reach their maximum size, which varies from 0.3 $\mu$ to 0.4 $\mu$ in diameter. This rather constant spheroidal shape facilitates the identification of the individual chromosomes throughout the various stages. At one stage in the late prophases the chain of chromosomes is tightly coiled about the nucleole.

This behavior of the chromosomes in *Carex* gives positive evidence in support of the view that chromosomes are permanent individuals with a definite and permanent relative arrangement in the nucleus.

The following papers were read by title:

*The Relation of Aspergillus niger, Penicillium digitatum and other Organisms to Tannic Acid Fermentation:* LEWIS KNUDSON.

*Some Problems in the Breeding of Sugar Beets:* C. O. TOWNSEND.

*The Oxygen Minimum and the Germination of Xanthium Seeds:* CHARLES ALBERT SHULL.

*Evaporation Studies in the Sand Dune Plant-associations of Lake Michigan and in the Beech Forest:* GEORGE D. FULLER.

*Studies of Castilla Seedlings:* PEHR OLSSON-SEFFER.

*Some Experiments on the Colors of the California Poppy:* PEHR OLSSON-SEFFER.

*Some Physiological Conditions in the Culture of Spirogyra:* W. D. HOYT.

*On the Character of the Resin-tissue of the Araucarineæ and the Podocarpineæ:* R. B. THOMSON.

*The Antheridia of the Laboulbeniaceæ:* J. H. FAULL.

*Homothallic Conjugation in Rhizopus:* FLORENCE A. MCCORMICK.

HENRY C. COWLES
THE UNIVERSITY OF CHICAGO

## THE AMERICAN SOCIETY OF ZOOLOGISTS CENTRAL BRANCH

THE annual meeting of the American Society of Zoologists, Central Branch, was held in conjunction with Section F of the American Association for the Advancement of Science in Pillsbury Hall of the University of Minnesota, Minneapolis, Minn., on December 28, 29 and 30, 1910, Professor C. E. McClung, of the University of Kansas, presiding.

The committee on nomenclature appointed at the Iowa City meeting reported that it was making progress in the formulation of a plan

whereby the various zoological organizations of America can unite in an effort to influence the International Commission on Nomenclature in the direction of securing greater flexibility in the interpretation of its own rules. The committee was given power to perpetuate itself.

The chair was authorized to appoint a committee whose function it shall be to recommend to the society plans for an agreement between its members regarding the form and manner of presenting papers for publication. Such plans shall have for their purpose the aiding of other investigators in arriving at an understanding of the methods and conclusions of writers with the least possible expenditure of time and effort.

Officers for the ensuing year were chosen as follows:

*President*—George Lefevre, University of Missouri.

*Vice-president*—R. H. Walcott, University of Nebraska.

*Secretary-Treasurer*—H. V. Neal, Knox College.

*Executive Committee*—H. B. Ward, University of Illinois (for three years); Chancey Juday, University of Wisconsin; H. W. Norris, Grinnell College.

The following, having received the votes of a majority of the executive committees of both branches, were elected to membership in the Central Branch: Dr. G. W. Tannreuther, University of Missouri; Dr. A. G. Ruthven, University of Michigan; Dr. R. C. Mullenix, Yankton College; Mr. H. Walton Clark, Bureau of Fisheries, Fairport, Iowa.

The following are titles and abstracts of papers presented at the meeting:

*Organ Inversion in Trematodes:* F. D. BARKER, University of Nebraska.

*Situs inversus viscerum* in varying degrees has long been known to occur in man. This deviation from the normal position of organs also occurs in a number of animals such as the tadpoles, flatfishes and molluscs. Variation in the position of the genital organs or *sexual amphitypie* is very common in the trematodes. From the examination of original specimens and the literature I have found this variation occurs in at least 26 different species, embracing 11 different genera of distomes and one genus of monostomes. The percentage of *sexual amphitypie* varies from 3 per cent. in some species to 50 per cent. in others. The degree of transposition of organs varies from the transposition of a single organ to that of six organs. In many cases other organs than the sexual organs are transposed, in which cases the term *situs inversus* is more applicable. Where only one or two organs are transposed this should be designated as *partial sexual amphitypie.*

A number of theories as to the cause of *situs inversus* has been advanced, among which are "the preponderance of the omphalo-mesenteric vein," "the persistence of the left venous trunks," "discontinuous substantive variation," "a condition essential to the existence of the organism," "inversion through sympathy."

Experimental work on incompletely separated blastomeres of the frog, sea-urchin, mollusc, etc., shows that such blastomeres give rise to twin embryos, one of which is a "mirror image" of the other. This suggests the possibility that "mirror images" or *sexual amphitypie* in the trematodes may be due to the development of twin trematodes which have arisen from completely separated portions of the "germ balls" in the sporocyst or redia stages.

Fuller account to be published later; place undetermined.

*Gametogenesis in Tænia serrata:* R. T. YOUNG, University of North Dakota.

Testes and ovaries arise from undifferentiated parenchyma cells. Oogonia and spermatogonia are similar in structure and appear to arise similarly. No mitoses are found in the early stages of development of these cells. Amitoses, while present, are too infrequent to account for the multiplication of the primitive sex cells, and it is probable, although not certainly demonstrable as yet, that increase is partly due to the development of nuclei either de novo or from chromidial extrusions from preexistent nuclei.

The spermatocytes of the first order arise from the spermatogonia by an enlargement of the nucleus and the formation of a skein from its reticulum. The spermatocytes fuse to form cytophores with subsequent breaking up of the skeins and commingling of the skein remnants with the cytoplasm of the latter. The secondary spermatocytes arise in the cytophores either *de novo* or from the skein remnants of the first spermatocytes. The spermatozoa are formed directly from the cytoplasm of the cytophores. In oogenesis skeins are similarly formed subsequent to the growth period and similarly degenerate without the occurrence of later stages of mitosis at this time. As the ova are leaving the ovaries or after reaching the uterus an abortive maturation mitosis occurs, without however the appearance of polar bodies; the cell or cells which have been

occasionally interpreted as such, being yolk cells attached to the ova during or after their passage to the uterus. These observations support the view previously advanced that cytological processes in cestodes are degenerating in correspondence with the general degenerate character of these worms.

Full account to be published elsewhere.

*The Biology of the Sand-Hill Region of Nebraska:* Robert H. Wolcott, University of Nebraska.

In Science for May 19, 1905, appeared a statement in regard to a faunal survey of this region which had been already inaugurated. Soon after the publication of this statement, conditions arose which interfered with the further prosecution of this work, and in the five years which have intervened only occasional short trips to the region have been made. During the past season, however, work was actively resumed by the collecting of water samples from the different lakes and the collection of additional data and specimens bearing on the topography and fauna of the lake region. A preliminary chemical examination of these water samples shows that the lakes vary in strength of alkali, expressed in terms of $CO_3$ and $HCO_3$ ions, from .06 of a gram per liter to 1.61 grams per liter—a difference of more than 25 times. The most highly alkaline of these lakes is not as alkaline as many other lakes which have been investigated in the far west, but the close proximity to one another, the exact similarity in every other respect than alkali content, and the fact that the alkalinity in the strongest of these lakes surpasses a percentage which apparently most of the forms present in the freshest lakes can not resist, seem to make it probable that the results of a careful qualitative analysis of the life of the different lakes will yield very interesting results. Arrangements have been perfected whereby a party is to be maintained in the region throughout the coming summer, and it is expected that in this way a sufficient amount of material can be gathered to allow of the formal presentation of results, at least so far as certain phases of the work are concerned.

*The Olfactory Organs and the Sense of Smell in Birds:* R. M. Strong, the University of Chicago.

A report was given of a comparative study of the organs of smell in various groups of birds. Results of experimental studies of the olfactory sense in ring-doves were also described. Evidence was obtained in this work that at least many birds probably have an olfactory sense. It is not likely, however, that the sense of smell is ever very keen in birds. A full account has been prepared for publication elsewhere.

*Results of Breeding Experiments with Ring-Doves:* R. M. Strong, the University of Chicago.

Crossing experiments with white and blond ring-doves were carried on during a period of five years. In the first generation, the hybrids resembled one parent or the other in equal numbers. The blond hybrids were mostly males and the white hybrids were all females. The original stock was found to breed true, but the blond hybrids behaved as heterozygotes. A full account of the results obtained will appear later.

*The Cranial Nerves of Siren lacertina:* H. W. Norris, Grinnell College.

The olfactory nerve is double. Anastomoses between the fifth and seventh nerves; general cutaneous fibers from the fifth and lateral line fibers from the seventh form a supra-orbital trunk, and similar fibers form an infra-orbital trunk; from the latter general cutaneous and lateral line fibers unite with a branch of the ophthalmicus profundus to form a nerve that sends its lateral line fibers to innervate neuromasts at the end of the snout and its general cutaneous component to form an anastomosis with the ramus palatinus; between the alveolaris VII. and the mandibularis V. the characteristic anastomosis occurs only to the extent of a slight contact between the two nerves. From the dorsal lateral line ganglion of the seventh nerve a nerve passes posteriorly to anastomose with the rami supratemporalis and auricularis X., suggestive of the condition in the Cyclostomata. The rami alveolaris and palatinus arise by a common trunk from which is given off a so-called "posterior palatine" that connects with the ramus pretrematicus IX. forming Jacobson's commissure. The ramus communicans carries general cutaneous fibers only, from the tenth to the seventh nerve. Pretrematic rami of five branchial nerves are found. The ramus intestinalis recurrens X. is entirely motor, its usual sensory component having separated to form a distinct trunk. The hypoglossal nerve is formed from branches of the first and second spinal nerves. Full account to appear in Vol. 17, *Proceedings of the Iowa Academy of Science,* 1910.

*The Innervation of the Lateral Line Organs in Amphiuma and Siren:* H. W. Norris, Grinnell College.

Kingsbury's classification and grouping of the lateral line organs in amphibia is found to correspond in a general way to their innervation in *Amphiuma* and *Siren*, but it is evident that the external distribution of neuromasts is no exact indication of their innervation. Much overlapping of groups occurs, and there appears to have taken place a considerable degree of migration of neuromasts from their points of origin. The occipital group of neuromasts is innervated not by the lateral line nerve of the trunk, as Kingsbury supposed, but by the rami supratemporalis and auricularis X. The ramus lateralis VII. in *Amphiuma*, contrary to the earlier opinion of the writer and of Drüner, has no connection with neuromasts. The neuromasts in *Siren* have a much less typical arrangement than in *Amphiuma*. Full account to appear in *Proceedings of the Iowa Academy of Science*, Vol. 18, 1911, under the heading "The Lateral Line Organs of the Urodele Amphibians: Distribution and Innervation."

*A Review of Recent Work on the Development of the Sympathetic Nervous System:* ALBERT KUNTZ, University of Iowa.

*Poulton's Theory of the Origin of Mimicry in Certain Butterflies:* J. F. ABBOTT, Washington University.

A biometric study of the variation of the color pattern of butterflies of the two species of *Limenitis, arthemis* and *archippus*, captured in the same region in New York State fails to confirm Poulton's theory that the latter form has originated from the former by an expansion and migration through the agency of selection, of color patches existing in the ancestral type (*arthemis*). The selection hypothesis by itself would thus seem inadequate to explain the origin of the phenomenon.

*Comparison of the Arrangement of Eggs in Nests of Japyx sp. and Scutigerella immaculata:* STEPHEN R. WILLIAMS, Miami University.

A photograph of two specimens of *Japyx* sp. guarding their eggs was snown. The two egg-masses were placed, each in a cavity in decayed wood, in such a way that only a very few eggs were in contact with the substratum. The rest were heaped upon these and touched nothing else in the cavity.

The attending individuals died within twenty-four hours and the eggs never hatched, being attacked by fungus.

Precisely the same arrangement of the eggs is seen in *Scutigerella immaculata*, which occupies the same habitat. The eggs are placed in a heap, few eggs only touching the moist decayed wood of the substratum and the rest above and around these. The female remains with the eggs to keep off fungi and animal parasites and no masses of eggs unattended by the female have hatched under laboratory conditions.

When *Scutigerella* in the laboratory is unable to find a sufficiently secluded place to deposit the eggs they will be laid singly here and there. In every case, however, the single egg is fastened to the substratum as if in preparation for heaping others about it.

Besides the well-known outward resemblances between *Japyx* and the Symphyla—the shape of the antennæ, the shape of the body, the presence of pairs of rudimentary legs on the segments of the abdomen—can these similar nesting habits not be considered as an additional indication of relationship?

*The Vitalism-materialism Controversy: Can it be Ended?* (vice-presidential address): W. E. RITTER, University of California.

*On the Transition from Parthogenesis to Gamogenesis in Aphids:* S. J. HUNTER, University of Kansas.

Observations on the conditions attending the appearance of the sexes in the aphid, *Toxoptera graminum*, now made continuously through four years, show that time of occurrence of sexes and attendant behavior of the agamic and intermediate forms continue as presented in a paper a year ago before the eastern branch.[1]

The problem of this year, beginning January last, was the addition of the woolly aphis to be studied under normal conditions, and an attempt to determine what bearing, if any, modifications in food supply might have on the *Toxoptera graminum*. A duplicate series of experiments in charge of two careful observers were established last January under the following conditions in the laboratory. Wheat was germinated in three-inch pots and each treated continuously with—instead of water—solutions of a number of salts—seventeen in all, respectively. New pots of wheat, similarly treated, replaced those in which wheat succumbed to treatment.

Daily observations and records were made on each one of these experiments throughout the

[1] SCIENCE, N. S., Vol. XXXI., p. 476, March 25, 1910.

entire year, and comparisons made with the stock growing in the laboratory. The wheat clearly showed the effect of the different treatments, but aphids did not manifest any significant change. When the sexual and intermediate forms began to appear on the regular stock in October they likewise began to appear on these experimental pots.

In the woolly aphis the agamic forms were wingless throughout the entire summer season. The first winged forms appeared September 19, and ceased to appear on December 6. The offspring of these winged forms are the true sexes. The first of these to appear was on December 25. These true sexes are wingless and in accordance with the observations of Von Baehr each female produces but one egg. All colonies do not produce winged forms and hence all colonies do not produce sexual forms. All winged forms of the woolly aphis do not produce offspring. Out of a series of nineteen isolated winged forms only eleven reproduced and these eleven brought forth twenty-seven young composed of twenty-one males and six females.

Thus far it appears difficult to correlate and establish external conditions which would appear to have a direct bearing on the transition from parthogenesis to gamogenesis in aphids.

In the two forms studied the sexes appear in the fall of the year and may be spoken of as seasonal. This is true also for a very large number of aphids whose behavior in this respect has been recorded by others. This naturally leads to a careful analysis of the conditions obtained at this period of the year. It is our purpose now to continue these studies throughout the next year, dealing chiefly with the questions of temperature and light.

*On a Case of Parasitic Thoracopagus in a Frog:* George Wagner, University of Wisconsin.

An instance of a frog having three extra legs extending from an irregularly shaped bone overlying the sternum; the case was interpreted as representing what by students of teratology is known as an epigastrius (Schwalbe), or a parasitic epigastrius (Adami). The case is believed to be the first of its kind reported in an amphibian. A full account of it will be published later in the *Biological Bulletin.*

*The Pomace Fly Bred in the Dark for 67 Generations:* Fernandus Payne, University of Indiana.

*The Proposed Laysan Island Expedition and Exhibit:* C. C. Nutting, University of Iowa.

*The Origin of the Sex-cells in Necturus:* Bennet M. Allen, University of Wisconsin.

The sex-cells of this amphibian arise from that portion of the mesoderm which lies between the future myotome and the future lateral plate. This anlage was recognized as early in development as an early medullary plate stage, owing to the fact that it is noticeably thicker than the lateral plate region lateral to it, and that it is at the same time marked off from the anlage of the mesoblastic somites by a constriction that indicates the first point of division of the mesodermal sheet.

The mesodermal cells show very slight differences at this stage, being equally filled with yolk, and having nuclei in which I, thus far, have been unable to distinguish constant and important differences, nor has it been possible thus far to differentiate them from the nuclei of the endoderm. It is just possible that further work may enable me to distinguish them in this and in earlier stages, by the use of special staining methods.

While the outlines of this sex-cell mass are vague at the outset, they become very clearly defined in later stages, when, first the myotome, and then the lateral plate tissues begin to use up their yolk material, while the sex-cells remain unchanged and do not divide. It then becomes evident that the sex-cell anlagen are continuous in the greater part of their extent, being somewhat interrupted only at their cranial and caudal ends.

At the stage with which this account begins, the Wolffian ducts have not yet been formed. So soon as they make their appearance, however, they lie immediately above and slightly medial to the sex-cell anlagen. In still later stages, the latter are seen to shift toward the median line. This movement accompanies the growth of the lateral plates and appears to be caused by it. The sex-cell anlagen finally meet in the median line and the mesentery forms beneath them. They then migrate laterally to the anlagen of the sex-glands.

While it will be seen that this account is quite in agreement with Dustin's account of the origin of the sex-cells in *Triton,* and consequently at variance with the process described in my paper on the origin of the sex-cells in *Rana pipiens,* I have nothing whatever to retract from the observations and conclusions expressed in that paper. Repeated study of my old preparations and of many new ones have confirmed their accu-

racy. Furthermore, the papers of King on *Bufo lentiginosus* and of Kuschakewitch on *Rana esculenta* have confirmed my work on *Rana pipiens*. While Dustin strikes a discordant note in his account of the origin of the sex-cells of *Rana fusca* and *Bufo vulgaris*, it may not be wide of the mark to tentatively advance the view that the sex-cells arise in the Urodeles from that portion of the mesoderm between the anlage of the mesoblastic somites and lateral plate, while in the Anurans they arise from that part of the endoderm that forms the median portion of the roof of the archenteron. This is not inconsistent with the conception of the sex-cells which is being more and more firmly established, namely, that they are cells preserved from early stages in an undifferentiated condition and that they are capable of considerable migration along radically different paths. There must, as a matter of course, be a more or less close correspondence in these migration paths in closely allied forms, but radical differences might be expected in such fundamentally different groups as the Urodeles and the Anurans.

*Anatomical Illustration before Vesalius* (with illustrations from original sources): W. A. LOCY, Northwestern University.

*On the Distribution in the United States and some Points in the Habits of Clinostomum marginatum:* HENRY LESLIE OSBORN, Hamline University.

This trematode was first recorded in Europe by Rudolphi in 1809 under the name *Distomum marginatum*. The following summary shows the records of its occurrence in this country with date, writer, name, host and infected part, and locality: 1856, Leidy, *Clinostomum gracile, Esox*, intestine, Delaware River; 1877, Leidy, *Distomum galactosomum, Roccus lineatus*, Philadelphia; 1879, Wright, *Distomum gracile, Perca flavescens*, branchiostegal membranes, Toronto; 1879, Wright, *Distomum heterostomum, Botaurus minor*, mouth, Toronto; 1885, Looss, *Distomum reticulatum*, silurid fish encysted in muscle tissue, Porto Rico; 1895, MacCallum, *Distomum gracile*, frog, encysted in pectoral muscle, Toronto; 1897, MacCallum, *Distomum heterostomum, Ardea herodias*, mouth, Toronto; 1898, *Distomum gracile, Eupomotis pallidus*, pectoral fin and roof of mouth, Kansas City, Mo.; 1901, Osborn, *Clinostomum marginatum, Micropterus dolomieu*, encysted in muscle, Nebish, Mich.; 1901, Osborn, *Clinostomum marginatum, Ardea herodias*, throat, Nebish, Mich.; 1903, *Clinostomum marginatum, Rana virescens*, encysted in cœlom wall and subcutaneous lymph spaces, Saint Paul, Minn.; 1903, Young, *Clinostomum marginatum, Micropterus dolomieu*, encysted in branchiostegal membranes and muscle, Troy, Ohio; 1904, Stafford, *Clinostomum gracile, Perca flavescens*, gills, Montreal. Its distribution is thus shown to be very wide, as indicated by the names Philadelphia, Troy (Ohio), Kansas City, Saint Paul, Nebish, Toronto and Montreal. And yet we do not know its primary host, the worm being virtually completely developed when found in the fish and frog. It is a trematode of economic importance, since it infects the edible portion of one of our principal game fishes, though it is presumably not strictly harmful to man. It is evidently very widely spread in northern and eastern United States and may be expected to be found outside the limits already noted as soon as search is made. The habits of the worm were studied in the forms encysted in the bass. The cyst is a perversion of the endomysial connective tissue and is wholly contributed by the host. The worm in the cyst is bent twice on itself, the ventral surface being turned toward the inner surface of the cyst whose cavity is completely filled by the worm. Immediately on escaping from the cyst the worm is very active indeed, its movements, besides many random and irregular ones, falling under two types: a retraction of the anterior end, producing a club-shaped front region possibly related with adhesion, and a thinning and flattening of the body such that its ventral surface becomes somewhat concave and the margins of the body assume the appearance of lateral fins. Neither of these two body forms were made practical use of by the worm, the body merely taking on the shape momentarily and then relaxing back at once into the resting form.

The worms in the frog were studied at St. Paul. They are not so much found in the muscle of the frog, their usual location in the fish, as in the cœlomic wall where the cysts lie, not in the muscular tissue, but between it and the peritoneum. The cysts, too, are very much larger than those in the fish and the worm is bent double within, the ventral surface being external. The cysts are similar in structure to those in the fish, being made up of fibrous tissue and supplied with a distinct capillary network.

It is planned to publish this paper in the *Biological Bulletin*.

*The Transmission of Trypanosoma lewisi by Rat Fleas (Ceratophyllus sp. and Pulex sp.), with*

*Short Descriptions of Three New Herpetomonads:* L. D. Swingle, Nebraska Wesleyan University.

The rat trypanosoma passes through a cycle of development in the digestive tract of rat fleas. After it is taken into the flea's stomach, it soon passes backwards into the intestine. The nucleus moves toward the posterior end, the blepharoplast toward the anterior end of the body and the undulating membrane is lost, so that a Crithidia results. Some of the individuals agglutinate by their flagellar ends and eventually form cysts. Others, by rounding off at the anterior ends, form cysts directly. In these the posterior end containing nucleus and blepharoplast remains very pointed. Forms resembling the "latent bodies" of *T. lewisi* were found in the crushed heads of fleas.

A case which might reasonably be interpreted as a conjugation of male and female forms was found.

The fleas harbor a natural flagellate, *Herpetomonas pattoni* n. sp. Two new herpetomonads are described: they are *Herpetomonas calliphoræ* n. sp. from *Calliphora coloradensis* and *Herpetomonas lineata* n. sp. from *Sarcophaga sarraceniæ.*

To be published in the *Journal of Infectious Diseases.*

*The Nature and Origin of the Fish-fauna of the Guiana Plateau:* C. H. Eigenmann, University of Indiana.

*Color Inheritance in Tumbler Pigeons:* Leon J. Cole, University of Wisconsin.

From black tumbler pigeons crossed with red were produced in $F_1$ 27 offspring, which were all black, with, however, reddish tips (often very conspicuous) on the feathers prior to the first molt. From these birds bred *inter se* segregation was obtained in $F_2$, which comprised 71 birds, of which 45 were black and 26 red. No explanation was offered for the departure from the Mendelian ratio. Furthermore, practically all these blacks in $F_2$ have reddish tips on the first feathers. This point was discussed in its relation to melanin oxidation and Mendelian inheritance.

Some results from other crosses were given.

*Sex Ratio and other Reproduction Statistics in Tumbler Pigeons:* Leon J. Cole, University of Wisconsin.

Statistics presented showed that of the two eggs laid by pigeons at a sitting each produces approximately an equal number of males and females, and that the chances are equal that the two eggs will produce birds of the same sex or birds of opposite sex. This corrects the popular notion that the two eggs of a sitting produce a pair of young (a male and a female) and that the first one laid usually, if not always, produces a male.

In 62 per cent. of 101 cases of tumblers the interval between the laying of the first egg and the second was 44 or 45 hours. Nevertheless, in a large percentage of cases the eggs hatch at approximately the same time.

The normal period of incubation is seventeen days, but birds allowed to sit on eggs which do not hatch will sometimes incubate up to thirty days.

(This paper and the preceding are based on experiments conducted at the Rhode Island Agricultural Experiment Station, the results of which will shortly be published in full by the station.)

*A Note on the Metamorphosis of Lampsilis lævissimus:* Robert E. Coker and Thaddeus Surber, Fairport Biological Station.

The glochidium of *Lampsilis lævissimus* is of the "axe-head" form similar to that of *L. alatus,* but without the hooks characteristic of the latter. The same form of glochidium is seen in *L. capax,* although in the shape of adult, *capax* is at an opposite extreme from *lævissimus.* Nevertheless, in certain significant taxonomic characters *lævissimus* and *capax* show agreement in the adult stage.

A few specimens of mussels in the stage of parasitism which show glochidial shells of the *lævissimus* form have been observed. These young mussels show a notable increase in size and a striking change of form as compared with the glochidial stage. It is not known that such marked changes occur in other species during the period of parasitism.

*An Alpheus with Two Equal "Snapping" Chelæ:* Charles Zeleny, University of Illinois.

*Some Data concerning Dibothriocephalus latus in America, with Report of a Second Case of Infection Acquired in the United States:* W. S. Nickerson, University of Minnesota.

I have collected from physicians reports of the occurrence of the fish tape-worm (*Dibothriocephalus latus*) of man in 65 cases, 51 of which were in Minnesota. But six of these have been previously mentioned in literature. The hosts in two cases were Swedes, in one a Japanese, in two native born, and the others with few if any exceptions were Finns.

I have also to report a second case of *Dibo-*

*thriocephalus* infection acquired in this country. It occurred in a woman who was born and has always lived in Hennepin County, Minn., never having been out of the state except once for a visit to North Dakota. While there she ate dried and smoked fish (otherwise uncooked) and it was soon after her return home that she experienced symptoms attributable to the tape-worm. The infection must therefore have occurred in America and from the eating of American fish.

*Paragonimus in a Cat in Minneapolis:* W. S. NICKERSON, University of Minnesota.

I wish to put on record the occurrence of *Paragonimus Kellicotti* in the lung of a cat from the grounds of the University of Minnesota. Three specimens were obtained.

*An American Intermediate Host for Hymenolepis diminuta:* W. S. NICKERSON, University of Minnesota.

The common tape-worm of the rat, *Hymenolepis diminuta*, is also an occasional human parasite, some fourteen cases having been reported. It has been shown in Europe that its cercocystis stage may be passed in several insects, the meal moth and its larva (*Asopia*), the earwig (*Anisolabis*), and beetles (*Akis* and *Scaurus*), *Asopia* being the form that commonly serves as intermediate host. In America an intermediate host has not been observed and attempts at experimental infection of our American meal-worms have not been successful.

A case of infection of a child in Minnesota by *Hymenolepis diminuta* has come to my attention in which the circumstances suggested strongly that the diplopod *Julus* had been the intermediate host from which the child had become infected. Acting upon this hint I fed fragments of *Hymenolopis diminuta* to young diplopods, supposed at the time to be young julids. Some of these were found subsequently to be full of cercocystides agreeing fully with those figured by Grassi and Rovelli and which they demonstrated experimentally to be the young of *Hymenolepis diminuta*. Later I learned that my diplopods were *Fontaria virginia* Bollman of the family Polydermidæ.

In an attempt to repeat the experiment, using *Julus* instead of *Fontaria*, I was able to obtain but a single specimen of *Hymenolepis diminuta* with but few proglottides having ripe ova. In one of the specimens of *Julus* to which the proglottides were fed a few specimens of cerocystides were subsequently found which were of the same sort as those previously obtained from *Fontaria*.

The rearing of the adult worm (Hymenolepides) from the larvæ by feeding experiments was rendered impossible in both cases by the fact that the infected condition of the myriapods was not discovered until they were already dead. In view, however, of their complete agreement with the descriptions and figures given by Grassi and Rovelli of the larvæ of *Hymenolepis* and the way in which they were obtained there can be no doubt as to their identity.

These experiments show that at least two different genera belonging to the class Myriapoda may act as intermediate hosts for *Hymenolepis diminuta* in America. The intermediate hosts previously known in Europe are of the class Hexapoda.

*Preliminary Account of the Early Development of Cirratulus grandis Verrill:* JOHN W. SCOTT, Westport High School, Kansas City, Mo.

The common fringe-worm of the Atlantic coast, at Woods Hole, is found in muddy ooze around the roots of eel grass. It is easily excited to oviposition, but few eggs will fertilize if deposited before 10 P.M. Eggs deposited during the night may be fertilized the next morning. The first polar body comes off in 10 minutes, and the second in 17 minutes. A yolk lobe is formed, may be constricted off, but is always reabsorbed. Unequal cleavage occurs at 49 minutes. The second cleavage, 8 minutes later, results in a three-celled stage. The entoderm appears to be separated at the first cleavage. The entoderm cell remains long undivided, and gastrulation takes place by overgrowth of other cells. The trochophore is scarcely able to leave the bottom and is never pelagic. At 51 hours it settles on the ventral side and moves like a flatworm; a ventral band of cilia is used for locomotion. Septa develop and disappear with the one exception found in the adult. An introvert arises as an infolding of the body wall posterior to the mouth; later a common opening serves for both. The introvert is used at this stage, chiefly for locomotion. The larva was kept until 20 days old.

*An Accessory Chromosome in the Opossum:* H. E. JORDAN, University of Virginia.

The number of chromosomes in equatorial plates of dividing spermatogonial and interstitial cells equals seventeen. Plasmosome present in resting primary spermatocyte. This stains intensely black in iron-hæmotoxylin, but only faintly green in Auerbach's stain (= methyl green + acid fuchsin). Plasmosome can not be traced into later

stages, but during synapsis a dark-staining sharply contoured body (accessory chromosome) appears at point where the loops converge. This point is always next the conspicuous centrosphere lying just outside of the nuclear wall. Plasmosome believed to become accessory chromosome on basis of similarity of form, *i. e.*, bipartite character. In post-synaptic stages, while the autosomes are still only slightly chromatic, the deeply chromatic monosome (accessory chromosome) always lies close to point where centrosphere is located.

Equatorial plates of first maturation mitosis contain nine chromosomes (eight bivalent ordinary and one accessory chromosome). The accessory, both here and in earlier stages, appears bipartite, sometimes completely divided and separated. The accessory passes undivided to one pole slightly in advance of the eight univalent ordinary chromosomes, the opposite pole receiving only eight chromosomes. Two types of secondary spermatocytes are formed, one with a slightly chromatic nucleolus (=accessory), the other without. Equatorial plates of second maturation mitoses show five chromosomes (four pairs of the eight univalents of last mitosis + one accessory) and four chromosomes, respectively. In late telophase the pairs are again resolved into nine and eight chromosomes, respectively. Dimorphism of spermatids—metamorphosis into spermatozoa and the presence of chromidial elements—were also considered.

This paper will be published in the *Journal of Morphology*.

*The Formation of the Spermatophore in Arenicola and a Theory of the Alternation of Generations suggested by the Facts in the Case:* Elliot R. Downing, Northern State Normal School, Marquette, Mich.

The spermatophore in *Arenicola cristata* arises as a result of the cleavage of a primary spermatogonium in a manner homologous with the cleavage of an egg in the same species. There is an invagination of certain spermatogonial macromeres and micromeres to form the nutritive cells which supply the developing spermatophore with food by their disintegration and absorption. These cells are homologues of the egg mesentomeres. The spermatophore is shed from the testis into the body fluid at an early stage, sometimes even before the cleavage of the spermatogonium has begun. Here the early spermatophore becomes a hollow mass of cells which later, by a false invagination, becomes gastrula-like. The false gastrula flattens out and becomes a saucer-shaped mass of spermatids. These develop within themselves the sperm.

The facts suggest that the spermatophore is an individual—the gametozoon which bears the gametes. The adult male is a sporozoon which develops the spores or primary spermatogonia.

The alternation of generations and reduction are independent phenomena, as is shown (1) by apogamy and apospory, (2) by the fact that among the protozoa and algæ reduction may occur before, during or after the conjugation of the gametes, that is, in either the sporo- or gameto-generation.

Reduction is an adjunct rather than a corollary of sexuality. If it were the latter, reduction should always occur in a definite relation to the sexual act, not before, during or after it.

The spermatophore must be suggestive of the primitive animal type just as the gametophyte suggests a thalline ancestry for plants. Perhaps the Volvocales come nearest, among living forms, the primitive form. In *Volvox* reduction has its animal position during gametogenesis.

If reduction occurred in the primitive forms before or during the fusion of the gametes the gameto- and sporo-generations would have the same number of chromosomes. This is the case in the gametozoon and sporozoon of *Arenicola*. Since all animals and many algæ have reduction in such a position the preponderance of evidence is that it had this position in the common animal and plant prototype. In plants, then, it has shifted from this primitive place toward the end of the sporophyte generation.

*Aquatic Photography for Zoologists:* Wm. Alanson Bryan, Honolulu, H. I.

The paper briefly explains and illustrates with lantern slides some of the essentials in the method and the apparatus used in securing photographs of aquatic objects for book and class-room illustration. The successive steps in evolving a method that resulted in securing the first aquatic motion pictures are explained.

*The Discovery of Archigetes in America, with a Discussion of its Structures and Affinities:* Henry B. Ward, University of Illinois.

Among the monozoic cestodes, often grouped as a separate class or subclass under the name Cestodaria, the Caryophyllæidæ stand closest to the merozoic cestodes, particularly to the Bothriocephalidæ. Neither of the genera previously known, *Caryophyllæus* or *Archigetes*, has been reported from this continent, although several

species are relatively common in Europe. During the past summer, a form belonging to this group was found in fish from the Illinois River at Havana. Its structure shows certain features which are common to both of the known genera, *Caryophyllæus* and *Archigetes*. It resembles the former in the absence of a caudal appendage and in the location chosen by the adult parasite, viz., the intestine of a fish, whereas, so far as known in Europe, *Archigetes* always possesses a tail and has been found only in the body cavity of tubificid worms. In general appearance and structure the American form resembles the European *Archigetes* very strongly. It has a scolex of fixed form with primitive suckers or phyllidia and also the musculature of *Archigetes*. The general arrangement of reproductive organs, especially the two rows of testes in the central field, and the genital pores, correspond also closely to conditions in *Archigetes*. Two alternative hypotheses present themselves: (1) the European forms may have a yet undiscovered adult stage in some vertebrate host and in that case the caudal appendage would be lost as in *Caryophyllæus* and in the form under discussion; (2) the American form described here may represent a higher stage of development. In the latter case the European form is either a degenerate type in which the intestinal stage has fallen out of the life history, leaving only a sexually mature larva parasitic in the body cavity, as *Amphilina* another cestodarian has been interpreted by Pintner; or the American form indicates the adaptation by which the invertebrate parasite has acquired a vertebrate host and includes in its life history two hosts, as is typical in cestodes generally. The full paper will be published elsewhere.

*Notes on Extinct Amphibia:* ROY L. MOODIE, University of Kansas.

*Chromosome Individuality:* C. E. MCCLUNG, University of Kansas.

*The Histogenesis of the "Transient" (Rohon-Beard) Cells in Selachian Embryos:* H. V. NEAL, Knox College.

The study of the histogenesis of the "transient" (Rohon-Beard) cells in selachian embryos confirms earlier conclusions based upon the study of the histogenesis of ventral nerves that the neuraxon process develops as an amœboid outflow of the neuroblast cell. The growth and histogenesis of the neuraxon process of the "transient" or "giant" cells of Rohon-Beard may be easily followed, since in reaching its peripheral termination the process grows into and through spaces devoid both of mesenchyma cells and of intercellular bridges or "plasmodesmata." Such spaces, however, are filled with a plasma containing a slight amount of coagulable substance which with some fixing reagents gives the plasma a vacuolated structure. The termination of the nerve fiber or neuraxon, as it penetrates these spaces, consists of many pseudopodia-like extensions. In some cases, as the neuraxon in its growth reaches the dorsal apex of the myotome, pseudopodial processes extend, some median and some lateral to the myotome. It seems to be a matter of chance whether in its further extension the neuraxon process shall grow median or whether it shall grow lateral to the myotome. Of a primary reticulum or "plasmodesma" connecting the neuroblast cell in the neural tube with its terminal organ there is not the slightest evidence. The experimental results of Harrison on amphibian embryos are fully corroborated by the evidence presented by the growth of the neuraxon processes of these "giant" cells.

Such facts obviously have an important bearing on the problem of the phylogeny of the vertebrate head, since they tend to disprove the assumption of earlier morphologists that nerve and muscle are inseparably connected and to make explicable the greatly modified metameric relations of the eye muscle nerves and possibly to give us the clue which may lead to the solution of the mystery of the chiasma of the trochlearis.

*The Origin of the Rudiments of the Mesenteron in the Honey Bee:* JAMES A. NELSON, Bureau of Entomology, Washington, D. C.

The anterior mesenteron rudiment of the honey bee arises at a period immediately after the appearance of the lateral folds, on the ventral surface of the egg near its anterior pole. It is at first nearly circular in outline, and sharply distinguished from the blastoderm by the deeper staining properties of its cells. At first it lies outside the area embraced by the lateral folds, but is later included in this area as the folds lengthen. Sections show that this mesenteron rudiment is produced by active proliferation of the cells of the blastoderm. After the union of the lateral folds this is detached from the blastoderm as a flat plate of cells which increases rapidly in extent, moves cephalad and soon covers the yolk at the anterior pole of the egg like a cap. The history of the posterior mesenteron rudiment is similar, but it is smaller, and first appears at the posterior pole of the egg. Later, after the rudiments of the appendages have ap-

peared, the stomodæal and proctodæal invaginations are formed at or near the places of formation of the mesenteron rudiments. The rudiments of the mesenteron at their inception are thus sharply marked off from the blastoderm of the middle plate (mesoderm) on the one hand, and the epithelium of the proctodæum and stomodæum (ectoderm) on the other. These observations are in close accord with those of Carrière and Bürger on *Chalicodoma*.

The so-called blastopore and the yolk plug described by Dickel (1904) for the honey bee have been observed; but the writer can not confirm this investigator's conclusions relative to these structures. The yolk plug, which Dickel thought connected with the formation of the mesenteron, was found in the same sagittal section with the true anterior mesenteron rudiment, the one on the dorsal, the other on the ventral surface of the egg, thus demonstrating that no close genetic relationship exists between them. The origin and fate of this so-called yolk plug is obscure, but it is a transitory structure, of very brief duration, possibly a vestigial organ.

*Birds of the Olympic Peninsula:* ALBERT B. REAGAN, U. S. Indian Service.

The Olympic Peninsula, Washington, extends from Grays Harbor on the Pacific coast north to the Strait of Juan de Fuca and east to the "sound." So far as the habitation of birds is concerned, the region divides itself into three parts—the coast strip, the mountains and the islands off the coast.

The coastal strip ranges from twelve to thirty miles in width. The central, high section is a circular area forty miles in circumference in the east central part of the peninsula, ranging from 6,000 to 8,000 feet in height, with a declining ridge extending northwestward to Cape Flattery. The whole mainland area, except in the high mountain districts, is heavily forested and covered with a dense underbrush so that near the coast it approaches the jungle state. For this reason birds in this division are hard to find, as they can so easily seclude themselves; but at the beach line and in the island districts they are in evidence.

The land species generally met with are: northwestern crow (*Corvus caurinus*), northern raven (*C. corax principalis*), desert sparrow hawk (*Falco sparverius phalœna*), black cloud swift (*Cypseloides niger borealis*), American crossbill (*Loxia curvirostra minor*), Audubon warbler (*Dendroica audubon*), rough-winged swallow (*Selgidopteryx serripennis*), rufous hummer (*Selasphorus fufus*), rusty song sparrow (*Melospiza cinera morphna*), sooty song sparrow (*Passerella iliaca (fuliginosa)*), bald eagle (*Haliœetus leucocephalus*), black merlin (*Falco columbarius suckleyi*), Peale falcon (*Falco peregrinus pealei*), harlequin duck (*Histrionicus histrionicus*), ruddy turnstone (*Arenaria morienella*), Hudsonian curlew (*Numenius hudsonicus*), northern phalarope (*Phalaropus lobatus*), barn swallow (*Hirundo erythrogaster*), western winter wren (*Olbiorchilus hiemalis pacificus*), pectoral sandpiper (*Actodromas maculata*), western sandpiper (*Ereunetes occidentalis*), lutescent warbler (*Helminthophila celata lutescens*), russet-backed thrush (*Hylocichla ustulata*), yellow warbler (*Dendroica œstiva*), black turnstone (*Arenaria melanocephala*), semi-palated plover (*Ægialitis semipalmata*), knot (*Tringa canutus*), wandering tatler (*Heteractitis incanus*), yellow legs (*Totanus flavipes*), also several species of ducks and geese (in migration).

It is the writer's opinion that there are 25,000 land birds in the peninsula.

The islands are principally on the Pacific side and there parallel with the coast, extending from the mainland only a few miles seaward at most. They number something like 100 points, rocks, pillars and islands proper. By position, they naturally divide themselves into three groups. These groups were each made a bird reserve by President Theodore Roosevelt and designated as follows: Copalis Rock Reserve, near Granville (Tahola), thirty miles north of Grays Harbor; the Quillayute Needles Reserve, in the vicinity of LaPush, Washington, and the Flattery Rock Reserve, including all the rocks and islands from the Ozette Indian village to the entrance of the Strait of Fuca.

These islands fairly swarm with birds. The species most commonly observed are: western gull (*Larus occidentalis*), glaucus-winged gull (*L. glaucescens*), Heerman gull (*L. Heermani*), marbled murrlet (*Brachyramphus marmoratus*),[2] California murre (*Uria troile californica*), black oyster catcher (*Hœmatopus bachmani*), loon (*Gavia imber*),[2] white-winged scoter (*Oidemia deglandi*),[2] tufted puffin (*Lunda cirrhata*), pigeon guillemot (*Cepphus columba*), dark-bodied shearwater (*Puffinus griseus*),[2] surf scoter (*Oidemia perspicillata*),[2] Cassin auklet (*Ptychoramphus aleuticus*), rhinoceros auklet (*Cerorhinca monocerata*), American scoter (*Oidemia americana*),[2]

[2] Migratory.

Keading petrel (*Oceanodroma kædingi*), Brandt cormorant (*Phalacrocorax penicillatus*), white-crested cormorant (*P. dilophus cinninatus*), Baird cormorant (*P. pelagicus resplendens*), western grebe (*Æchmophorus occidentalis*),[2] Holboell grebe (*Colymbus holboellii*).[2]

It has been estimated that the birds of the island groups, including the migratory birds, number at least 100,000.

One hundred and thirty-seven species of birds have been listed from the Olympic Peninsula, and are described in the paper of which this is an abstract.

The full paper will probably appear in the *Transactions of the Kansas Academy of Science.*

*The Differentiation of Neuroblasts in Artificial Culture Media:* M. L. SHOREY, Milwaukee-Downer College.

The experiments to be described were conducted for the purpose of gaining evidence regarding the factors involved in the differentiation of neuroblasts. Previous experimental work has led to the expression of two radically opposed views; one that they are entirely self-differentiating (Harrison, 1907, Braus, 1906), the other that no differentiation occurs except in the presence of the normal end-organs, or the products of the metabolism of these organs (Shorey, 1909).

Neuroblasts from the medullary canal of *Necturus* were placed in artificial culture media, one containing the products of muscular metabolism, and the other not. In each the cells remained alive for a considerable period of time, but only in the first were fibers developed.

*Spermatogenesis in the Mole Crickets:* W. J. BAUMGARTNER, University of Kansas.

The paper will show the method of formation of the tetrads, and the method of maturation division. The work indicates that while Vom Rath is correct in theory, his figures are not at all true to the conditions found in the specimens. His illustrations must have been drawn mostly from imagination.

The chromosomes in the maturation divisions show a constancy of number, and a constancy of the series of shapes through which the individuals pass. The accessory is present, and one of the tetrads divides unequally.

This paper will be printed in Kansas University Science Bulletin.

H. V. NEAL,
GALESBURG, ILL. *Secretary*

[2] Migratory.

## *SOCIETIES AND ACADEMIES*

### THE TORREY BOTANICAL CLUB

THE first meeting of the club for 1911 was held at the American Museum of Natural History, on January 10, President Rusby in the chair. Dr. C. A. Darling, of the department of botany, Columbia University, was nominated for membership.

This being the annual meeting, reports were presented by the various officers.

The report of the treasurer was presented and upon motion referred to an auditing committee.

The secretary reported that fifteen meetings had been held during the year with a total attendance of 467, as against 411 in 1909, and an average attendance of thirty-one, as against twenty-seven last year. Twelve persons have been elected to membership, and eight resignations received and accepted. Six illustrated lectures were delivered during the season at which the combined attendance was 319, as against 251 at seven meetings last year.

The editor reported that the *Bulletin* for the year 1910 contains 630 pages and 36 plates, and that the expense of its publication was less than the amount allowed for it by the budget committee. He also reported that only one paper had been published in the *Memoirs*, this being a paper by Dr. O. Butler on "The Californian Vine Disease." The editor declined to be considered for reelection.

The editor of *Torreya* presented a special report for that periodical. The volume of *Torreya* for 1910 contained 292 pages.

The chairman of the field committee reported that twenty-three meetings were advertised during the year, one of which was an afternoon lecture at the New York Botanical Garden. Eight meetings were not held on account of stormy weather or from other causes. At the fourteen field meetings actually held there was a total of 103 persons present, making an average attendance of a little more than 7 at each meeting.

As chairman of the local flora committee, Dr. N. L. Britton gave a brief report of the investigations being carried on by Mr. Norman Taylor on the local flora.

Election of officers for the year 1911 resulted as follows:

*President*—H. H. Rusby.

*Vice-presidents*—Edward S. Burgess and John Hendley Barnhart.

*Secretary and Treasurer*—Bernard O. Dodge.

*Editor*—Philip Dowell.